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Preliminary Studies on Root Parasitic Nematodes of Rice in Texas and Louisiana [1]

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Radopholus oryzæ (v. Breda de Haan) Thorne was found in 1954 for the first time in rice fields of Texas and Louisiana (2). This finding stimulated a survey for other genera of root parasitic nematodes in rice fields (3). In addition, soil fumigation tests were initiated in 1955 to secure basic information and to evaluate the damage nematodes may cause on rice.

Nematodes in Rice Fields

In 1954, 76 samples of rice roots and surrounding soil were collected from widely separated rice fields in the States of Texas and Louisiana. A number of these samples were obtained from recently harvested fields since such root samples seemed to yield the largest numbers of nematodes. In the laboratory the nematodes were separated from the soil and root by the use of sieves and the Baermann funnel, and then examined to determine the presence of plant parasites. The plant parasitic and suspected parasitic nematodes found are listed in Table 1. Large numbers of free-living (saprophytic or predacious) nematodes also were found.

Of the parasitic nematodes listed, *Tylenchorhynchus martini* Fielding, 1956, was found most frequently, in 66 percent of the samples. *Radopholus oryzæ* was found in 18 percent of the samples. Nematodes of the genera *Ditylenchus*, *Pratylenchus*, *Paratylenchus* and *Rotylenchus* were found in only a limited number of fields, but frequently in high populations. Although nematodes belonging to the genus *Ditylenchus* were found in the soil-root samples, such nematodes might not be root parasites. Some of the nematodes found and included in Table 1 may be primarily parasites not of rice but of other plants. Parasitism has been established only for *R. oryzæ* and *T. martini*.

The nematode populations were found to vary greatly from one rice field to another. Larger numbers of parasitic nematodes were found mostly in fields that had grown two or more consecutive crops of rice. The practice of growing only one or two rice crops in a rice-pasture rotation probably influences nematode populations.

Efficiency of Soil Fumigation

In 1955 four soil fumigation tests were conducted in Louisiana and Texas with four commercial nematocides. The purpose of these tests was to measure the damage to rice by nematodes and the benefits that might be derived from their control. The nematocides were used in rates two to three times higher than those regularly recommended

[1] Contribution of the Field Crops and Horticultural Crops Research Branch, Agricultural Research Service, United States Department of Agriculture and the Louisiana and Texas Agricultural Experiment Stations for presentation at the meeting of the International Rice Commission, November 1956.

TABLE 1. *Parasitic or suspected parasitic nematodes found in rice fields in Texas and Louisiana.*

Species	Distribution, in percentage of 76 samples collected	Species	Distribution, in percentage of 76 samples collected
Parasitic forms		**Suspected parasitic forms**	
Radopholus oryzæ	18	*Psilenchus hilarulus* de Man	17
Ditylenchus sp. [a]	3	*Psilenchus aberrans* Thorne	3
Ditylenchus sp. [a]	3	*Psilenchus* sp. [a]	17
Pratylenchus zeæ Graham	4	*Tylenchus* sp. [a]	33
Tylenchorhynchus martini	66	*Dorylaimellus virginianus* Cobb	9
Tylenchorhynchus sp.	3	*Dorylaimellus* sp. [a]	8
Meloidogyne sp. [b]	1	*Longidorus* sp. [a]	4
Helicotylenchus sp.	5		
Hoplolaimus sp. [a]	1		
Rotylenchus sp. [a]	1		
Criconemoides sp. [a]	3		
Paratylenchus sp. [a]	1		

[a] Undescribed species.
[b] Only males and larvæ found.

for other crops to obtain a high degree of nematode control. At current prices the treatments cost from U.S. $80 to U.S. $800 per acre. The two tests carried out in Louisiana yielded only inconclusive results (4).

One of the 1955 tests (1) on a commercial rice farm in Chambers County, Texas, gave some interesting results which are summarized in Table 2. The predominant parasitic nematode in the test area prior to treatment was *Tylenchorhynchus martini*, but smaller numbers of other parasitic nematode, such as *Psilenchus* sp. were encountered. After thorough soil preparation the chemicals were applied in April to 14 × 20-foot replicated and randomized plots with 4-foot alleys. The MC-2 (methyl bromide) was applied under polyethylene covers which were removed after 48 hours. The other treatments, Dowfume W-85 (ethylene dibromide), D-D Mixture and Nemagon, were applied with a MacLean Fumigun at a 6-inch depth and at 12-inch intervals. The plots were sown with Bluebonnet 50, a representative Texas rice variety, approximately one month following treatment. Fertilizer was purposely omitted from the plots since it was assumed that injury from nematodes would be more pronounced at lower fertility levels. Samples from the plots were harvested at maturity, and the rice y elds are given in Table 2.

The plots treated with nematocides gave consistent and statistically significant higher grain yields than the untreated control plots. The rice plants on treated plots were noticeably taller and darker green in color. The plots treated with MC-2 were conspicuously better in appearance than the others. Satisfactory nematode control was obtained with each of the nematocides, as determined by soil and root samples taken from the plots at three stages of plant growth.

Methyl bromide and ethylene dibromide were used in a test at the Rice Pasture Experiment Station, Beaumont, Texas, where the predominant parasitic nematodes were *Radopholus oryzæ* and *Tylenchorhynchus martini*. The test was conducted in 1955 in a

TABLE 2. *Results of a soil fumigation test in Chambers County, Texas, 1955* [a].

Treatment	Active Ingredients	Rate of application	Rice yield in pounds per acre [a, b]	Yield increase over control	
				Pounds	Percent
Dowfume MC-2	Methyl bromide 98%	3 lb./100 sq. ft.	2656.8	826.2	45.1
Dowfume W-85	Ethylene dibromide 83%	12 gal./acre	2462.4	631.8	34.5
D-D Mixture	Dichloropropane, Dichloropropane mixture 100%	40 gal./acre	2349.0	518.4	28.3
Nemagon	1, 2 - Dibromo - 3, Chloropropane	5 gal./acre	2365.2	534.6	29.2
Control	—	—	1830.6	—	—

[a] L.S.D. .05 = 414.6 lb. per acre.
L.S.D. .01 = 603.3 lb. per acre.
[b] Average of three replications of dry cleaned rough rice.

TABLE 3. *Results of a soil fumigation test at Beaumont, Texas, 1955* [a].

Treatment	Average number of nematodes per pint sample [b]		Average height of rice plants, in inches	Rice yield in pounds per acre
	Tylenchorhynchus martini	*Radopholus oryzae*		
MC-2, 2 lb./100 sq. ft.	0	0	46.2	2097.1
Dowfume W-85, 12 gal./acre	2	178	44.2	1679.7
Control	387	229	42.5	1552.6

[a] Based on average of four replications.
[b] Samples consisted of soil and rice roots at maturity of plants.

manner similar to the test in Chambers County. In the Beaumont test the population of *R. oryzæ* was high at the end of the season in plots treated with Dowfume W-85, as indicated in Table 3 in which the average rice yields of different treatments are also included.

The MC-2 gave excellent nematode control and higher rice yields than the controls as well as taller plants with darker green leaves. The effect of Dowfume W-85 was not so pronounced as that of MC-2. The populations of *Radopholus oryzæ* were nearly as high in Dowfume W-85 plots at maturity of rice as in the untreated plots.

Studies on the root parasitic nematodes of rice in Arkansas, Louisiana and Texas are being continued.

Literature Cited

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Control of the Oriental Red Mite on Citrus Seedlings in Jordan

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THE Government of Jordan is encouraging the extension of the citrus industry and the Ministry of Agriculture has established nurseries in various parts of the country to provide citrus seedlings to the farmers.

Many of the new plantations are located in areas where no citrus has been grown previously. For this reason, it is especially important that the seedlings which are used in planting the new groves be entirely free from plant pests and diseases in order to prevent their spread to the new citrus growing regions.

The most serious pest of the citrus seedlings in the Jordan nurseries is the Oriental red mite (*Anychus orientalis* Zach.). The leaves of infested plants become greyish or mottled and turn chlorotic in appearance. These tiny mites and their webs can be seen with the aid of a hand lens. In contrast to the common red mite (*Epitetranychus althæa* v. Hanst.), which feeds only on the lower surface of the leaves, they feed only on the upper surface of the citrus leaves.

Life History

The following life history observations were made during September 1956 at the plant protection laboratory of Amman under nearly optimal conditions. The female lays up to eight eggs per day mainly along the midrib on the upper side of the citrus leaf. The highest number of eggs laid by any one female under observation was 32. As is the case with many other species of red mites, unmated females oviposit normally but only males develop from the unfertilized eggs. The eggs hatch in from two and a half to three days. The larvæ feed for about eight days before changing to the adult stage after which they normally mate almost immediately and begin laying eggs within a few hours.

However, development of the mite may vary with climatic conditions. High temperatures (21-27° C.) and medium air humidity (59 to 70 percent) are optimal for the development of all stages of the mite. It was observed that the eggs are very sensitive to low air humidity. Under the climatic conditions prevailing in Jordan up to 18 generations a year are possible.

All stages of the mite can be found on citrus leaves throughout the year but the damage it causes is most apparent during summer and autumn.

Control Measures

The citrus nursery of Wadi Shaib, located in the eastern part of the Jordan Valley at an altitude of 250 meters, was selected for the tests. It is irrigated regularly, creating an ideal micro-climate for the development of the mite. The weeds are cut at frequent intervals and left to dry on the soil. It is thought that this practice may prevent the mites from spreading to other host plants, possibly increasing the intensity of attack on the citrus seedlings.

Examination of the nursery on 3 September 1956 showed that all of the seedlings were heavily infested with all stages of the Oriental red mite, some leaves harbouring as many as 200 mites. Three adjoining plots of 40 square meters each were marked out and treated as follows at 11 : 00 A.M. on 8 September 1956.

In Plot 1 the roots of each seedling (20-30 centimeters high) were watered with a watering-can with 250 cubic centimeters of a solution containing 0.1 per cent Systox, a highly toxic, systemic, organic phosphorus insecticide.

In Plot 2 the seedlings were left untreated as a control plot.

In Plot 3 the roots of each of the seedlings (35-85 centimeters high) were watered with 500 cubic centimeters of a solution containing 0.2 per cent Systox.

Results of the Experiment

Observations made 20 hours after treatment showed that the mites were moving normally on the upper surface of the leaf with no apparent toxic symptoms. However, 31 hours after treatment the mites in Plot 3 were all dead, while those in Plot 1 were still active, but all were dead 24 hours later.

Daily examination of the plots showed that the seedlings in Plot 1 remained free of mites until 4 October, 26 days after treatment, when three females were observed on the lower leaves of one seedling. The seedlings in Plot 3 remained free from mites until 19 October, or 41 days after treatment. The seedlings in the untreated or control plot, Plot 2, continued to be heavily infested during the test.

In addition to this test, one application of 250 cubic centimeters of a solution containing 0.2 per cent Systox per plant to the roots of *Eucalyptus* and *Accacia* seedlings in a nursery at Jericho gave excellent control of cockchafer larvæ, *Polyphylla* sp.

These results indicate that Systox is a promising material for use in treating the roots of seedling plants in nurseries for the control of the Oriental red mite, and probably for other mites and insect pests as well. It is suggested that the dosage of Systox may vary with the size of the plants and the pests requiring control. On irrigated land it is further suggested that this material should be applied about two days before the next irrigation when the soil is dry, as the plants will absorb the Systox more quickly at this time.

Systox, however, is a very toxic material and great care should be taken to keep it from coming into contact with the user and to wash it off with water immediately in case of accidental contact. It should not be applied to plants or parts thereof that are to be used for food by man or warm-blooded animals.

Phosphates as Soil Insecticides for the Control of Sugar Beet Root Maggot[1]

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CHLORINATED hydrocarbons mixed with fertilizer have been shown to effectively control the sugar beet root maggot, *Tetanops myopæformis* (von Röder)[2]. Although a reduction in stand due to the treatment was noted, the differences were eliminated during the thinning operation. In a search for less phytotoxic chemicals a series of phosphate insecticides was tested as materials for seed treatment, and as fertilizer mixture. As organic phosphates have not been extensively employed as soil insecticides, these experiments should provide additional information relative to phosphate insecticides and their possible use as soil insecticides.

Materials and Methods

The field plan consisted of single-row treatments 50 feet long and replicated four times. A powered garden seeder was redesigned so that the seed and fertilizer were placed into the same furrow and covered. This was done so the method of planting would correspond closely to the planting practices of growers.

The treated seed was prepared by mixing the insecticides with a 5 per cent solution of methylcellulose. Approximately 110 milliliters were used to treat one pound of seed. Fertilizer (0-43-0) was employed throughout the tests at 100 pounds per acre. When insecticides were mixed with fertilizer it was assumed that the bulk of the fertilizer did not change, so the machine settings were identical throughout the plot.

Orthocide treated seed from the same lot was employed throughout the experiment. Types of insecticides, rates of application and formulations are given in Table 1, together with the results.

Stand counts which were used as an index to measure phytotoxicity were made before the thinning by hand. The beet seedlings were counted in two representative 100-inch segments of each row. At harvest time, beets in a 35-foot segment of each row were gathered, counted, weighed and checked for maggot injury.

Results

The results with regard to seedling stands and numbers and yields of beets harvested in various treatments are summarized in Table 1.

The data indicate a serious reduction in the stand caused by the phosphate insecticides. American Cyanamid 3911 as an emulsion concentrate appears to be more phytotoxic than when absorbed on carbon. Dow ET 14, as shown in previous experiments,[3] drastically reduced germination in the greenhouse and also caused the leaves of beet seedlings to curl. Observations in the field indicated no such effect.

From the number of merchantable beets harvested, it is evident that differences in stands were not eliminated by thinning.

The weights of beets harvested may serve as an indication of the effectiveness of insecticides in controlling the sugar beet root maggot. Although increases in yields were shown in a number of treatments, statistically significant higher yields were noted only in treatments where American Cyanamid 3911 and Hercules AC 528 were used. Significantly lower yields were obtained from the

[1] Approved for publication by the Director of the Agricultural Experiment Station as a contribution of the Department of Agricultural Entomology.

[2] GOJMERAC, W. L. and J. A. CALLENBACH. 1956. Sugar beet root maggot - one year's trials in Red River Valley show that chemical control is feasible. North Dakota Bimonthly Bull. 18: 115-120.

[3] GOJMERAC, W. L. 1956. Effects of insecticides on germination and emergence of sugar beets under greenhouse conditions. Jour. Econ. Ent. 59: 710-711.

TABLE 1. *Effects of organic phosphates as soil insecticides on emergence and yield of sugar beet.*

Treatment	Average seedling stand, in number [a]	Average number merchantable beets [b]	Average weight merchantable beets in pounds [b, c]	Calculated yield, in tons per acre
American Cyanamid 3911 50% on carbon, 1 lb. per 100 lb. seed	80	19.3	26.1	9.5
American Cyanamid 3911 90% emul. conc., 1 lb. per 100 lb. seed	25	17.5	25.2	9.4
American Cyanamid 3911 90% emul. conc., 2 lb. per 100 lb. seed	25	21.8	24.0	9.0
Hercules AC 528 25% wettable powder, 1 lb. per 100 lb. seed	68	23.3	29.6	11.0
Dow ET 14 25% wettable powder mixed with fertilizer, 1 lb. per acre	26	17.0	26.6	10.0
Dow ET 14 25% wettable powder mixed with fertilizer, 2 lb. per acre	12	13.3	22.5	8.5
Dow ET 15 25% wettable powder mixed with fertilizer, 1 lb. per acre	15	13.5	16.2	6.1
Dow ET 15 25% wettable powder mixed with fertilizer, 2 lb. per acre	15	12.5	14.9	5.6
American Cyanamid 3911 50% on carbon mixed with fertilizer, 1 lb. per acre	34	18.8	31.0	11.6
American Cyanamid 3911 50% on carbon mixed with fertilizer, 2 lb. per acre	24	14.5	28.0	10.5
Malathion 25% wettable powder mixed with fertilizer, 2 lb. per acre	42	13.5	15.4	5.8
Malathion 25% wettable powder mixed with fertilizer, 2 lb. per acre	19	10.0	11.9	4.5
Check A	103	20.5	21.2	8.0
Check B	112	23.8	20.9	7.8

[a] Based on stand counts made in two 100-inch segments in each of four replicated rows.
[b] Based on beets harvested in a 35-foot segment in each of four replicated rows.
[c] L.S.D. at 5 per cent level = 9.0

treatments where malathion was used. Observations also indicated that none of the beets in rows where malathion was used as a soil insecticide were protected from maggot injury.

Summary and Conclusions

Phosphates are not very satisfactory as soil insecticides for sugar beet. They all reduced germination quite drastically. American Cyanamid 3911 on carbon and Hercules AC 528 did not reduce germination as much as the other insecticides employed in this test; however, even with these two insecticides the reduction was nearly 25 percent. American Cynamid 3911 on carbon mixed with fertilizer, when used for seed treatment, appeared to protect beets from root maggot injury.

Plant Disease Situation in the United States[1]

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An Outbreak of "European Canker" of Apple Trees in California

CARL W. Nichols, of the California Department of Agriculture, and E.E. Wilson, of the University of California, write that apple canker, or "European canker" as it is known in the United States, caused by the fungus *Nectria galligena* Bres., is reported as an important disease in Europe. In North America it has been found from northeastern United States and southeastern Canada to the Pacific Coast. In Oregon it is said sometimes to affect the pear more severely than the apple.

In California, European canker was reported as early as 1909, but localities in which it occurred were not specified. In 1912, it was identified on apple specimens from Sonoma and Humboldt Counties, and in 1921 on apples from Humboldt County. The Bureau of Plant Pathology, California Department of Agriculture, received specimens from Humboldt County in 1946 and 1955 and from Del Norte County in 1950.

The three counties in which the disease was found are situated on the coast north of San Francisco Bay in a region where winter rainfall is heavy and temperatures are moderate throughout the year. Apparently, therefore, in California as elsewhere, the disease is most likely to occur in regions where the climate is mild and damp in winter.

In January 1955 attention was called to a canker disease of apple trees in an orchard near Sebastopol, Sonoma County. Symptoms were similar in all respects to those described for European canker and a fungus isolated from the cankers produced conidia typical of the *Cylindrocarpon* stage of *Nectria galligena*. The creamy-white sporodochia of the fungus were often present on affected twigs collected during rainy weather or help for a time in a moist chamber.

By March, small, red, ovate to spherical structures were found on cankers that were one or more years old. Some contained immature asci, but during the spring and summer of 1955 none were found with ascospores, and none of the attempts to develop the structures to maturity succeeded. In the spring of 1956, however, after an extensive search, one perithecium was found with mature ascospores. The perithecium and the ascospores were similar to those described for *Nectria galligena* and colonies produced from the ascospores developed conidia similar in size and shape to those described for that fungus.

In a survey made in co-operation with the Agricultural Commissioner's Office and the Agricultural Extension Service of Sonoma County, the disease was found in seven more orchards in Sonoma County. In addition, one specimen was received from the neighboring county of Marin. In a limited survey made by the Bureau of Plant Pathology of the California Department of Agriculture, with the Agricultural Commissioner's Offices, in the Sierra Nevada foothill apple-growing district of Butte County, in Mendocino County which joins Sonoma County on the north, and in Monterey and Santa Cruz Counties on the coast south of San Francisco Bay, no other cases of the disease were found.

Apple varieties most commonly affected by European canker in Sonoma County were Gravenstein and the red sports of Delicious, the latter apparently being the more susceptible. Trees of the Golden Delicious, Jonathan, and Rome Beauty varieties growing in the same orchard with diseased Delicious were free from the disease.

Lesions that appeared during the winter were usually located at the nodes of twigs of the previous growing season. Leaf scars have been reported to provide the avenues of entry for the fungus in this type of in-

[1] This report is based upon material submitted by Collaborators of the Plant Disease Epidemics and Identification Section, Agricultural Research Service, United States Department of Agriculture.

fection. Both in 1955 and 1956 such lesions had become visible by early January. Few if any new lesions developed in the spring of 1955, but some developed in the spring of 1956. These were commonly located at the base of the new growth, at places where no leaf scars occurred. Little if any infection of pruning wounds was found; this differs from the situation reported in Oregon.

At times the fungus extended from infected spurs or side shoots back into the supporting branches and there produced cankers 2 to 4 inches long. It was on such cankers that the perithecia were initiated.

Fruit infection was not seen and is unlikely to become prevalent in Sonoma County, where rains are infrequent after the fruit is formed.

Judging from its behavior during the past two years, the disease may cause extensive damage to the twigs and branches of susceptible apple varieties under Sonoma County conditions. In one orchard it killed several small trees and destroyed many twigs on mature trees. The fungus survives for several years in the branch cankers, where in winter it produces an adequate supply of conidia for new infection. Infection by ascospores is apparently less frequent.

Since most of the infection takes place through them the protection of leaf scars with a fungicide has resulted in a marked reduction of the incidence of new infection, according to European and Oregon reports. Bordeaux mixture is the fungicide most commonly employed. It was therefore recommended that the trees be sprayed with Bordeaux mixture 10 : 10 : 100 in autumn as soon after leaf-fall as possible. In 1955 one grower followed this procedure. In addition he carefully removed the diseased twigs from the trees although he did not take out all of the larger branches with cankers. In 1956, twig infection was comparatively rare in his trees, whereas it was abundant in trees of an adjoining unsprayed orchard.

Silver-Leaf of Montmorency Sour Cherry in Oregon

Williams, H.E., and H.R. Cameron of Oregon State College, report that *Stereum purpureum* (Pers. ex Fr.) Fr. has been present for at least 40 years in Oregon, but has not been recognized in commercial orchards and has never been reported to affect Montmorency sour cherries. In 1954 a block of Montmorency containing 448 trees was surveyed. Sixty-three, or 14 per cent of the trees, were showing silver-leaf symptoms. Since then Montmorency sour cherry trees infected with *S. purpureum* have been found in two additional orchards in widely separated areas of western Oregon.

Individual trees showed symptoms of silver-leaf on from one small branch to the entire tree. Severely affected branches dropped flowers or young fruit. Affected leaves had a silvery cast, were smaller in size than normal, and were sometimes slightly misshapen and somewhat bumpy (Figure 1). The most severely affected leaves displayed varying amounts of necrosis which consisted of marginal burning or scattered necrotic spots. Terminal growth on affected branches was stunted. A brownish discoloration in the central core of the xylem, evident only at some distance from the terminals and darker at the advancing margin, was always associated with branches bearing silvered leaves. The roots showed discolored areas near the trunk, but isolations from smaller healthy appearing root tissues also yielded the same organism that was isolated from the discolored areas of branches (identification confirmed by Dr. Mildred K. Nobles, Senior Mycologist, Botany and Plant Pathology Laboratory, Ottawa, Canada).

Observations during 1955 and 1956 indicated that many of the infected trees had recovered. Some trees still showed symptoms but had made sufficient recovery to be producing nearly normal crops. The orchard surveyed in 1954 was examined again in 1955 when 67 new infections were discovered, and 19 trees which had shown symptoms the previous year appeared to have recovered. In 1955 the disease seemed to be increasing rapidly, but another inspection of the orchard early in 1956 indicated continued recovery of infected trees.

The dying of branches or whole trees that could be directly related to the presence of the fungus has rarely occurred in Oregon.

The original source of fungus inoculum in this orchard was thought to be native Oregon oak, *Quercus garryana* Dougl., which had been cut down in the immediate vicinity.

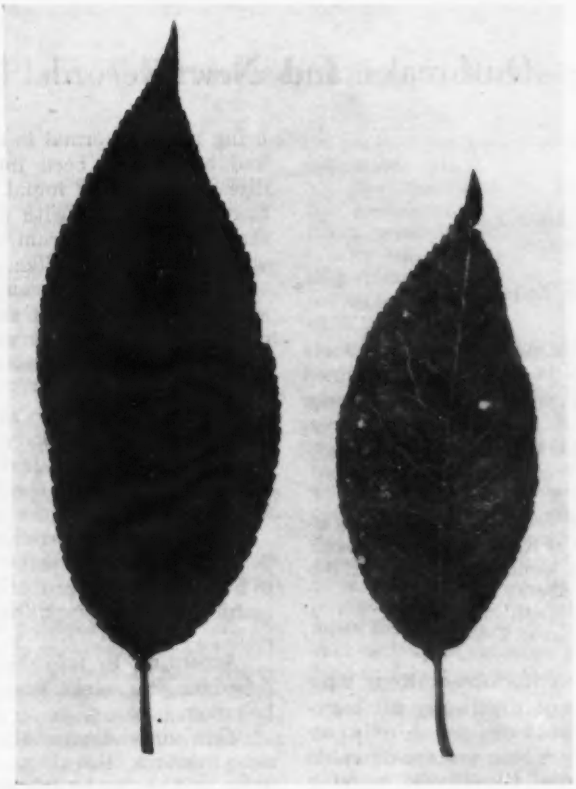

Figure 1. Montmorency sour cherry leaves. Healthy leaf at left. Leaf at right shows reduced size and silver cast of affected leaves.

The oak was a symptomless host and the fungus fruiting bodies were found only on dead wood.

Burning the diseased prunings and treating broken limbs and cuts with grafting wax or Bordeaux paint have been recommended for control. Attempts were made to reduce incidence of the disease by spraying with 25 pounds of zinc sulfate per 100 gallons of water when the trees were dormant. Apparently recovery was more rapid and disease symptoms were less severe on the sprayed trees than on the checks, but the general improvement of the entire orchard prevented any definite conclusions. Trees treated with 8-hydroxyquinoline sulfate in solution did not express symptoms in the year following treatment but have not been under observation long enough to determine whether the fungus has been eliminated.

In Oregon as in the Netherlands warm summer temperatures seem to be sufficient to keep the fungus in check and to allow most infected trees to recover eventually without additional treatment.

Outbreaks and New Records

Syria

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Occurrence of Peach Yellows

DURING September and October 1956 some peach orchards in Syria were examined for the presence of virus diseases. In four orchards located at the following places, disease symptoms were found which strongly indicated the presence of peach yellows:

(*a*) Experiment orchard of the Agricultural School at Kharabo near Damascus.
(*b*) An orchard along the road from Damascus to Kharabo.
(*c*) An orchard south of Zebedani.
(*d*) An orchard near Zebedani.

At the time when the observations were made, peach fruit was practically all harvested and symptoms were noted only on leaves and branches. There was considerable variation in severity of the disease, ranging from dieback of branches to the occurrence of only one or two affected twigs on an otherwise healthy-looking tree, indicating that the spread of the disease was still in progress. Whereas in a severely affected tree found in the orchard of the Agricultural School dieback and willowy growth with chlorotic inwardly rolled leaves were evident, there was hardly any change in leaf colour in all other diseased trees observed. The symptoms obviously began to develop while the season was advancing, the first leaves of a shoot being usually normal in size. On trees that had apparently been infected recently the diseased twig was found either on the surface of the crown with a little wiry tuft at the end or arising from the centre of a tree with witches-broom-like growth.

Some trees were completely changed in appearance because of the even distribution of symptoms over the whole surface of the crown. The diseased trees were considerably stunted.

In one orchard the manager pointed out that the diseased trees were located around one spot, where the first diseased tree was standing, suggesting the transmission by an insect vector.

The disease occurred not only in several peach varieties but some seedlings appeared to be also affected, probably due to the unsuccesful grafting or budding with diseased material.

According to information obtained near Zebedani the same disease occurs also in Lebanon.

This virus disease should be considered as a serious threat to peach-growing in Syria and probably also in Lebanon. Transmission experiments to ascertain the identity of the disease have been initiated. According to Kunkel *et al* [1] peach yellows does not persist in warm districts in the United States probably because of inactivation of the virus by heat. This evidently does not hold true for the virus causing the yellows symptoms in Syria.

[1] KUNKEL, L. O., M. A. BLAKE and T. F. MANNS, 1951. Peach yellows. *In* Virus diseases and other disorders with virus-like symptoms of stone fruits in North America. U.S. Dept. Agr. Agriculture Handbook 10.

Plant Quarantine Announcements

Brazil

Ministerial Order No. 986 of 10 November 1955, published in the *Diario Oficial* 24 November 1955, modifies the requirements for the importation of potatoes.

The importation of potatoes is prohibited unless each consignment is accompanied by a phytosanitary certificate and a certificate of origin, issued by the competent service of the country of origin and signed by the Brazialian Consul at the port of departure, stating that:

(*a*) in the consignment of potato tubers or tubers of other solanaceous plants, potato wart (*Synchytrium endobioticum*), ring rot (*Corynebacterium sepedonicum*) and golden nematode (*Heterodera rostochiensis*) have not been found;
(*b*) the potatoes are, in addition to the above-mentioned diseases, free from other dangerous plant pathogens;
(*c*) where seed potatoes are concerned, the potatoes were grown in fields under supervision which had been officially inspected for virus diseases and are in accordance with the standards provided in the official classification, except in cases that the potaoes are second or further generation of vegetative propagation which may not be imported as seed potatoes.

The potatoes destined for importation must be clean and packed in containers specifically marked and bearing inscriptions "Certified seed potatoes,, in Portuguese, English or French and also the name of the variety and an indication of the generation.

The Director of the Brazilian Plant Protection Service will establish the tolerance limits of minor pests and diseases in imported potatoes.

In case the phytosanitary certificate is missing or imperfect, the potatoes may not be imported under bond as provided in Decree No. 24114 of 12 April 1934.

Order No. 78 of 25 January 1955 is revoked.

United Kingdom (Jersey)

The Importation of Plants, Seeds and Potatoes Order, 1956 (see *FAO Plant Prot. Bull.* 4 : 173-175. 1956.) has been amended by a new Order cited as the Importation of Plants, Seeds and Potatoes (Amendment) (Jersey) Order, 1956, which came into force on 12 November 1956. The amendment establishes, under restrictions on the importation of certain produce grown outside the other British Islands or the Republic of Ireland, that cuttings of carnation plants are prohibited to land in Jersey unless they are derived:

(*a*) from plants which have been tested and found to be free from bacterial wilts caused by *Pseudomonas caryophylli*, *Erwinia* sp. or other similar organisms, and which have been derived immediately from plants found to be similarly free from such bacterial wilts; or
(*b*) from countries where such bacterial wilts are not known to be established.

News and Notes

Desert Locust Situation

In a recent summary of the desert locust situation [1] attention was called to the possibility of swarms escaping from the summer breeding areas of Chad Territory and the Sudan to reinfest northwestern Africa and the Arabian Peninsula and thereby leading to a general re-establishment of the desert locust plague. Although very extensive control operations were undertaken, the local organisations were unable to achieve complete success and apparently a considerable number of swarms escaped to the east and west. In the Sudan, over 4,000 tons of bait were used in the campaign.

The summer breeding in the Sudan was over by mid-November 1956 by which time operations against the winter breeding on the Red Sea coast had begun and from where 58 swarm reports were received during November. Nineteen of these swarms were destroyed by baiting. The very extensive summer breeding in Chad Territory ended in early October but many swarms were formed. Throughout October large numbers of swarms were reported in most parts of the Territory. Considerable summer breeding also took place in Niger Colony and further new swarms were probably produced there.

In early October several swarms invaded the north of Ethiopia from the Sudan. Swarms probably crossed the Red Sea at about the same time, the first swarm being reported from the southwestern coast of Saudi Arabia on 1 October; by the end of the month 13 swarm reports had been received. In this area hoppers were first reported on 26 October and by the end of the month a heavy infestation which had developed was being attacked by Egyptian and Saudi Arabian control teams. Fledglings of the new generation began to appear towards the end of November. Two swarms reached northwestern Yemen in mid-October and commenced breeding; control operations were undertaken by the joint FAO-Yemen teams.

To the west, the escaping swarms spread to French Sudan and Mauretania where 19 swarm reports were received in October. One swarm penetrated into Nigeria at the end of October. On 9 October the first swarm reached southern Algeria and during the month 14 swarm reports were received. Morocco was invaded on 14 October and by the end of the month a considerable concentration of swarms was present in the southwest of the country. Spanish Sahara was invaded on 6 October and Ifni on 15 October.

Although there has been no swarm activity elsewhere and no serious developments have arisen from the high scattered locust populations in India and the Somali Peninsula, the range of the plague extended greatly in October. Further developments will largely depend upon the outcome of the winter-spring campaigns in the Arabian Peninsula and northwestern Africa.

[1] LEAN, O.B. 1956. The desert locust situation 1955-56. FAO Plant Prot. Bull. 5: 1-3.

International Congress of Entomology

The Tenth International Congress of Entomology (see *FAO Plant Prot. Bull.* 4 : 60, 1956) was held in Montreal, Canada, August 17 to 25, 1956, and was attended by over 1,300 professional entomologists, representing at least 62 countries. The First Congress was held in 1910, and all Congresses previous to 1956, except the Fourth, which met at Ithaca, New York, in 1928, have been held in Europe. Responsibility for the Congresses rests with a Permanent Committee organized on an international basis.

Host institutions in Montreal were McGill University and the University of Montreal, and among the actively co-operating organizations were the Entomological Society of Canada, and the Entomology Division, Canadian Department of Agriculture. Entomologists of the Division, especially those located in Ottawa, carried the major load of the tremendous preparations which were necessary for many months prior to the Congress. The all-round general excellence of the Congress and the large attendance attest eloquently to the thoroughness of those preparations, as well as to the growing importance of the science of entomology.

At least 50 persons were there from England, nine from Japan and seven from Russia. More than 500 entomologists from the United States attended. More than 700 scientific papers or lectures were presented, divided into 15 sections based on subject matter affinities. In addition to the opportunity for familiarity with the scientific work of entomologists from other countries, the Congress provided a splendid place for the informal meeting of people with common interests, who hitherto in many cases have been known to each other only through the written word. The exchange of ideas and points of view, and personal acquaintanceship, are very helpful, and the Con-

gress provided ample social events and time for free discussion. During the main period of the Congress a week-end excursion to historic Quebec City, and a one-day trip to Ottawa, were made. Several hundred members and associate-members of the Congress participated in both excursions, which gave a chance to relax after some rather full days of scientific sessions, as well as time to make new friends and absorb some of the atmosphere of eastern Canada. Following the Congress, several excursions to both nearby and distant laboratories and natural areas, of interest to entomologists with varied research, collecting or administrative interests, were made for periods ranging from a few days to two weeks or more.

At Ottawa, the visitors were shown the fine, modern laboratories of the National Research Council of Canada, and those of the Division of Entomology. In fact, one of the highlights of the Congress for many visitors was the realization of the splendid progress and enlightened approach which now characterizes entomology in Canada. Among the brochures distributed to visitors was a report on entomological teaching in Canada, a directory of entomologists in Canada, and a listing of current entomological projects. A 181-page issue of the *Canadian Entomologist* was also distributed, containing a concise general article on the International Congresses of Entomology (by W.R. Thompson), a review of developments and accomplishments of entomology in Canada up to 1956 (compiled by Robert Glen), and a 124-page fundamental paper on Canada as an environment for insect life (by Eugene Munroe).

The 15 sections in which scientific material was presented encompassed the entire field of entomology. In sections dealing with systematics, ecology, and geographic distribution, special problems associated with insects of northern North America were very thoroughly discussed. Taxonomists spent a profitable morning discussing speciation and related matters. Among the general discussions by prominent travelers and collectors were fine, illustrated lectures by Dr. Renaud Paulian and Dr. J. Linsley Gressitt on Madagascar, and on New Guinea and nearby islands respectively. Dr. B.P. Uvarov, Director of the Anti-Locust Research Centre, and several members of his staff attended the Congress and participated in several sessions which included material on the biology and control of grasshoppers and locusts. During an afternoon-long symposium on this subject, Dr. Uvarov emphasized the need for studies in fundamental biology, rather than too much dependence on short-term results from insecticides, even though those results may be conspicuously successful on a temporary basis. Biological control, which is studied widely and eagerly in Canada, was discusses in many sessions. For instance, in three sessions dealing with orchard entomology (especially that of apples), problems of mite pests and their predators were featured. Dr. Walter E. Fleming, of the U.S. Department of Agriculture, reported that the control of the japanese beetle in the eastern United States through the colonizing of bacteria, nematodes and wasps is well demonstrated.

Considerable attention was given to recent developments in the control of soil insects. Dr. J.L. Brann, of Cornell University, discussed equipment for applying insecticides to row and field crops, and he stressed the view that instead of making spraying and dusting machines of larger size, horse power and expense, more progress may result from a better understanding and application of the factors concerned in getting the chemicals to the plants from the tanks. Dr. R.H. Painter, of Kansas, reported on the considerable progress which has been made, during a 30-year program at Kansas State College, on the development and practical use of plants resistant to aphids.

The foregoing are a few examples of the timely subjects discussed during the scientific sessions of the Tenth Congress. Work is now under way at Ottawa on the assembling and editing necessary to the publication of the Proceedings. Sets of mimeographed abstracts were available during the Congress, and in some cases, due to such reasons as publication elsewhere or the length of the manuscripts, abstracts rather than complete papers will appear in the Proceedings.

Certainly, the Proceedings will be an extremely valuable publication. — (Ashley B. Gurney, Entomology Research Branch, U.S. Department of Agriculture, Washington, D.C.)

Roma - Tip. del Senato del dott. Giovanni Bardi